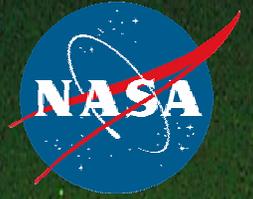


NATIONAL AERONAUTICS AND SPACE ADMINISTRATION



# VIEW

*Independent Verification and Validation Facility*

*Buchannon and Elkins, West Virginia  
Aurora captured by Tim Reyes*

VOLUME 3, ISSUE 1, JANUARY – MARCH, 2007

## Director's Point of View...

The first quarter of the year has found us working hard together to sharpen our skills and our wits as we tighten the tried and true while taking on some new approaches to our work. I have enjoyed challenging our team and being challenged by them. This is a team that never fails to rise to the challenge before them, thanks in great part to the terrific leadership that preceded me. Just before going to press, we took a few moments to acknowledge one such leader. To honor his many contributions to the success of the IV&V Facility's programs, I share here the letter of commendation I presented to Bill Jackson with the IV&V Summit Award—an award set aside for those few who inspire us professionally and personally by overcoming all obstacles to reach the height of achievement.



March 27, 2007

Dear Mr. William (Bill) Jackson:

*On behalf of the men and women of NASA's Independent Verification and Validation (IV&V) Facility, I want to express our great respect and appreciation for your many contributions to our organization's success. Your technical expertise and sage guidance has cemented our Facility's great reputation for excellent service to NASA programs, and outstanding innovation in software assurance and IV&V research.*

*As a direct reflection of your superb leadership as the Acting Director and Deputy Director, NASA recognizes our Facility for its integrity, technical capabilities, and tremendous service. Your commitment to enhancing West Virginia and the surrounding communities was the cornerstone of our illustrious reputation as a great community partner.*

*I thank you for your dedication to the personal growth and career success of each member of our Facility. Your leadership has served to strengthen our purpose and has instilled the core values that will sustain and guide us far into the future. You have brought great honor upon yourself, our Facility, NASA, and our Nation.*



*Thank you very much from the grateful men and women of the Facility.*

## Table of Contents

THEMIS: Tripping the Light Fantastic	3
Research Trip Reports: KSC and IEEE	4-6
And When We're Not on the Road	6
Outreach is Not Such A BIG Job	7
Safety Awareness Poster Contest	7
Lincoln's Lessons in Leadership	8-9
Team Leaders: IV&V Senior Staff	10-11
Our Value-Ables: Letter to the Editor	12-13
Peer Awards: Teamwork	13

The auroral lights are a product of a very complex and dynamic system – the earth's magnetosphere and its interaction with the solar wind. The solar wind is a constant outflow of energetic particles from the upper atmosphere of the Sun. Large explosive events also occur on the sun's surface that cause coronal mass ejections (CME) of energetic particles.



On October 28, 2003 such an event was directed toward the earth and the accompanying photo, taken on October 30<sup>th</sup>, between Buchannon and Elkins, WV, shows aurora that resulted. The colors are the light emitted by Oxygen and Nitrogen in the upper atmosphere due to ionization from high energy protons and electrons, not unlike the glow of neon lights. Most the time, the earth's magnetic field funnels the energetic solar wind particles to the polar latitudes where scandinavian and eskimo cultures have lived and have incorporated the mysterious events into their folklore. With CMEs, the sheer number of particles entering the earth's magnetosphere overwhelm the system leading to auroras at lower latitudes such as over West Virginia. Auroras have both small and large scales. Their breadth can encompass thousands of miles and at the same time, there are intricate small events embedded within them. Decades of research and space missions have led to better understanding of these beautiful events and the THEMIS mission, which NASA IV&V has supported, will lead to even greater understanding of earth's protective magnetic field.

Tim Reyes

Cover Image Credit: Tim Reyes, a member of the extended family of NASA IV&V contractors, is a Senior Systems Engineer for Mountain State Information Systems (MSIS).

Managing Editor: Donna Ozburn  
Editor: Kathleen Millson

Please submit news items and/or photos to  
Kathleen.M.Millson@nasa.gov; 304-367-8445.  
All submissions are subject to editing.

## THEMIS: TRIPPING THE LIGHT FANTASTIC

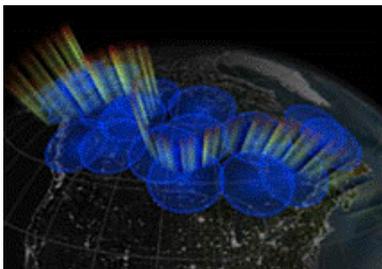
On February 15th NASA launched five identical space probes — the largest number of spacecraft ever attempted by the agency on a single rocket — to solve a decades-long mystery about the origin of magnetic storms that turn the green, shimmering curtains of the Earth's Northern and Southern Lights into colorful, dancing light shows.



An artist's concept of the five THEMIS spacecraft strung out in orbit around Earth, searching for what triggers substorms in the aurora, or Northern Lights, which are visible as a prominent halo around the North Pole.

THEMIS is named after the Greek goddess of justice, often called "blind justice," because it will impartially decide which comes first, current disruption or magnetic reconnection. Spread out along the magnetotail, THEMIS will time the sequence of electrical discharges and magnetic field changes, and coordinate with ground-based cameras spread over Alaska and Canada, to discover the time history of these events, perhaps resolving the mystery within months of going online.

The 20 All-Sky cameras and the ground-based observatories housing their acquisition systems were built by the SSL team. Magnetometer sensors which measure currents in near-Earth space were built by UCLA scientists or contributed by the University of Alberta. Sixteen of these observatories were installed across Canada by University of Calgary scientists in places like Inuvik, Whitehorse, Prince George, Goose Bay and at

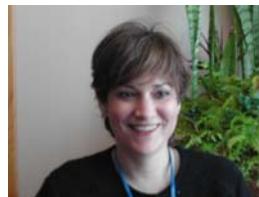


the Ekati Diamond Mine, while another four were installed in Alaska by SSL.

In addition, UCLA scientists have buried \$20,000 ground-based magnetometers near 10 schools across the northern United States so that grade-

school students can participate in THEMIS experiments and learn, through specially designed curricula, about magnetism and the Earth's interactions with the sun.

For the past three years IV&V has provided SERVICES to the THEMIS mission by focusing its efforts on the flight software for instruments and flight avionics—critical for the successful collection of science data as well as various orbit maneuvering required throughout the mission lifetime. When asked about her involvement as the IV&V Project Manager for THEMIS, Judi Connelly, while clearly well-versed regarding the technology and the interest of science, also revealed her enthusiasm for the “magic of the Auroras” and the power of that magic to capture the imagination of young students and inspire them to participate in such missions, now and in the future.



I remember watching with my kids the 1995 movie “Balto”. This movie based on the true adventure of an Alaskan sled dog named Balto who trekked across the frozen tundra to deliver a serum to a remote village in 1925. At the end of the movie the Northern Auroras help lead him home. Whether that

part of the story is true I cannot say but it’s a nice way of introducing kids to the real magic of the Auroras. The THEMIS mission will help scientists unlock the secrets of Auroral substorm explosion that result in these lights dancing across the sky. This will ultimately help us all to understand the impact of the dynamic Sun on the Earth's environment.

The GEONS( Geomagnetic Event Observation by Students ) outreach program is a good example of how NASA can inspire and engage our youth in real missions. I've enjoyed working with the professionals associated with this project from beginning to launch. Their work is truly is an example of a gold standard .

Judi Connelly

## Research Trip Reports

*"Many a trip continues long after movement in time and space have ceased." John Steinbeck*

Steinbeck certainly captured the hopes of two members of our Research team who spent time on the road meeting with colleagues from across our Agency and our discipline in the past several weeks. Lisa Montgomery traveled to Kennedy Space Center to encourage greater involvement in the Software Assurance Research Program (SARP) that IV&V manages on behalf of the Office of Safety and Mission Assurance, while Wes Dadrick took off for Blue Sky, Montana to attend the 2007 IEEE Aerospace Conference. Both returned excited about "continuing" their trips through further knowledge sharing and relationship-building on behalf of IV&V with many of those with whom they met.

### Kennedy Space Center

Lisa Montgomery



Located on Florida's central Atlantic coast, the Kennedy Space Center (KSC) is NASA's principal launch base and the prime center for the test, checkout and launch of payloads and space vehicles. The center is responsible for the assembly, checkout and launch of Space Shuttle vehicles and their payloads, landing operations and turn-around of Shuttle orbiters between missions, as well as preparation and launch of unmanned Scout vehicles from Vandenberg Air Force Base (VAFB).

The Research team visited KSC in late January to talk about opportunities for our colleagues at KSC to be more involved in the Software Assurance Research Program and also how our research could support current and future missions.

I must confess that try as I might not to gawk like a tourist, there were a couple of times I just couldn't help myself. Looking for a place to park I noticed that most of the spaces seemed to be reserved either for a government vehicle of some sort or require a permit. As I was trying to make sure I didn't park in the wrong place I came across a very particular reserved spot. Astronaut parking. I couldn't help myself. I had to grab my camera from my bag and snap a shot. So much for looking like I belonged.

I also found myself quite envious of the drive to work that my Kennedy colleagues enjoy. Dolphins, cranes, and palm trees are exotic

to a West Virginian. Of course some of my envy might also have been influenced by the fact that while it was in the teens and snowy back home I drove across the Indian River under blue skies enjoying temperatures in the 50s. KSC's eastern boundary fronts on the Atlantic Ocean and sits on about 140,000 acres most of which is given over to critters of various sorts in the wildlife refuge and national seashore.

Inside the Headquarters building there is a bronze of the Center's namesake and the challenge that forged the character of an agency. There's something so cool about wandering the buildings at KSC. Through years and paint it its still possible to feel the echoes of the men and women who accomplished so much in those early days.

In order to live up to our past successes and move forward into the next chapter of space explorations, it will be necessary for all of NASA to work together. To help support that, IV&V's Research Team was on the road. It was a valuable opportunity to talk with people at KSC about the Software Assurance Research Program and how they could be involved and how the research that we'd already done could support their current and future efforts. I'm confident that we were well received; it's hard *not* to look favorably on a group who offers to help make your job easier. NASA is such a large agency juggling so many different challenges that it's little



wonder that folks have little time to keep up with what is going on outside of their own domain, so a chance to hear first-hand about the work unique to Kennedy and to offer up practical ideas for collaboration with our research program was invaluable.

Our talks with representatives from the Engineering Directorate as well as Safety and Mission Assurance were fruitful and we look forward to making good ideas live. Stay tuned.

## IEEE Aerospace Conference

*Wes Deadrick*

The 2007 IEEE Aerospace Conference included a blend of basic and applied research presentations, informational/educational sessions, plenary sessions, and panel discussions. The intent of the IEEE conference (now in its 28th year) has been to promote an interdisciplinary understanding of aerospace systems, their underlying science and technology, and their applications to government and commercial endeavors.

The structure of the conference wasn't unique but several of the features were. The conference's twelve technical tracks structured around:

- Space Missions, Systems, and Architecture
- Antenna Systems and Technologies
- Communications and Navigation Systems and Technologies
- Electro-Optic Sensors and Observation Systems
- Remote Sensing
- Spacecraft Avionics Systems and Technologies
- Spacecraft and Launch Vehicle Systems and Technologies
- Air Vehicle Systems and Technologies
- Software and Computing
- Diagnostics, Prognostics, and Health Management
- Mission Ops Concepts, Technologies, and Experiences
- Management, Systems Engineering and Cost

A total of 450+ paper presentations were delivered during the 6 day conference. In addition to paper presentations, the conference included panels, poster sessions, informational/educational presentations, a junior engineering conference, and plenary sessions.

Seven high-level panel sessions were interspersed throughout the conference and addressed topics such as, Technology for NASA's Earth and Space Science Missions, NASA Exploration Program: Creating the Technology, Spacecraft Autonomy: Where We Are and Where We are Going, The Next \*Big Things\* at the DoD Laboratories, etc. Each of the panels focused initially on the current state of the practice and then refocused on

where technology is headed in the field. The panels included representatives from NASA, Army, Navy, Air Force, DARPA, industry, and academia. Each of the panels I attended were thought provoking and engaging and were the high points of the conference for me.

The conference provided access to a number of informational/educational presentations focused on selected NASA missions, primarily Science Missions with the exception of Constellation. For example, mission overview presentations were given for JWST, STEREO, MRO, MESSENGER, EDL component of MSL (~8 presentations!), Constellation, etc. The presentations included a range of topics spanning mission overviews, science objectives, and planned technology.

A unique experience was the inclusion of a Junior Engineering Conference. Tuesday afternoon was devoted to student (grade school through high school) presentations and poster sessions. The topics were aerospace as well as some fairly complex studies related to science and technology. Finally, the conference included seven plenary sessions populated by leading scientists, government officials, and industry figures. All of the topics were not focused on the aerospace field but were, nevertheless, quite interesting. Topics



//RESEARCH

Ranged from questioning the intelligence of early humans, to politically charged topics related to America's dominance of space, and then just generally interesting topics like the mysteries behind pricing.

I found the Software and Computing track to be quite broad, but given the nature of the conference, I don't think this was inappropriate. The largest session in the software track also turned out to be the most relevant to our research focus. The title of the session was *Advanced Software*

*Verification Tools* and included seven presentations. Verification was used broadly and did include validation. Interestingly enough, of the seven presentations, six were either off-shoots of or initially funded by SARP or had some relation to previously SARP funded research.

I would certainly recommend that the Facility consider supporting an engineer's attendance at this conference in the future. If the conference was a movie I would go with two thumbs up.

## And When We're Not on the Road...

Research Status Reviews were held March 19 through March 29 at the IV&V Facility. Researchers, practitioners, and other stakeholders were welcome and encouraged to attend. This quarter's Research Awareness Meeting, primarily geared toward IV&V project managers and analysts, was also held March 29.

Wes Deadrick will lead the SARP Research Infusion efforts. A preliminary list of candidate technologies for the next round of Research Infusion will be available by the beginning of May. Suggestions are welcome and encouraged; if you are aware of a need or a specific technology we should consider, please let us know. Selections for the FY08 OSMA SARP research initiatives are expected to be announced May 7.

IV&V will host OSMA's Software Assurance Symposium (SAS 2007) October 9-11 at the Lakeview Conference Center in Morgantown, West Virginia. Come join us for one of the Agencies best opportunities for information sharing and some beautiful autumn scenery in the mountains.

Our efforts to make the robustness testing techniques available to projects continue. Initially, robustness testing support was provided to any project that uses the VxWorks operating system; however, robustness testing support can be made available to any project that utilizes a real-time operating system application programming interface.

The IV&V Facility funded initiative *Evaluation of Current Requirements Analysis Tools Capabilities for Performing IV&V in the Requirements Analysis Phase* recently delivered an Evaluation Report detailing the comparisons of various methods for performing requirements evaluation. A comparison of 6 tools E-Smart/ARM, Lexior, QuARS, Requirements Assistant, SAT, and TEKChecker was performed. Based on the initial study, SAT, Requirements Assistant (RA), and E-Smart/ARM will be further tested in

Marcus Fisher

a comparative study. SAT and RA are being recommended based on their accuracy in identifying issues, especially those consistent with IV&V manual analysis, and the potential ability to decrease analysis time. The team is now running the tools against the artifacts of a current project.

One of the deliverables we are anticipating is the final version of the Practitioner's guidebook from the SARP sponsored *Program Model Checking Case Studies and Practitioner's Guide* initiative. This 103 page guide will provide a practical, foundational understanding of a broad and complex topic and provide useful guidance concerning resources to provide more information. For instance, on the topic of model construction the authors share, based on experience that, "manual model construction is time consuming and prone to error," and they point the reader in directions to learn more about why it's hard, and some common mistakes to avoid. Visit the results web-site <http://sarpreults.ivv.nasa.gov/> to obtain additional information regarding any product.

As we move forward with the SARP Research Infusion efforts, we are preparing a preliminary list of technologies for possible infusion. The list will be made available for comment at the Software Working Group Face-to-Face at the beginning of May. Some candidate technologies under consideration for the next round of Research Infusion include: Code Surfer, tested at KSC in a previous Research infusion effort with positive results; SAVE, tested at Johns Hopkins University / Applied Physics Laboratory (JHUAPL) in a previous Research infusion effort with positive results, the Software Architecture Visualization and Evaluation (SAVE) tool and process are used to preserve the architectural goals in order to support maintenance and evolution of established systems; Software Process Assurance for Complex Electronics (SPACE), a possible candidate for Research Infusion with JSC; Reactis, a tool that supports model-based testing and validation.

## Outreach is not always such a **big** job...



IV&V OUTREACH

Outreach Manager, Jess White, spent some time building rockets with the Little Explorers in Bridgeport, West Virginia, this February. The Little Explorers are three to six years old—just the right age for blasting off pop rockets. They entertained Jess with their performance of “I’m a Little Rocket.” In case you’re not familiar with this catchy song, you can sing it to the tune of (you guessed it) “I’m a Little Teapot”:

**I'm A Little Rocket.  Pointing Towards The Sky.  
4, 3, 2, 1, Rumble, Rumble, Rumble  
Blast Away! Blast Away! Fly!**

## SAFETY AWARENESS CAMPAIGN (SAC) POSTER CONTEST

Show off your child's artistic talents in this year's SAC Poster Contest. When it was announced that the second annual Goddard SAC is scheduled to occur in April, we decided to get in on the fun with our own IV&V version of the event. This year's theme is "Safety for Life."

All dependents of civil servants and contractors can use their artistic side to create a poster, which conveys the theme "Safety for Life" as it relates to work we do for the Agency or for the Facility at IV&V. A prize will be presented to winning posters in each age category and will be displayed at the Facility during our Spring Fling April 27th. The deadline for entries is April 23. Submit your child's poster to Donna Ozburn or Kat Millson.



If you would like details about the SAC at Goddard, visit <http://safety1st/campaign.postcontest-1.cfm>.

# Lincoln's Lessons in Leadership

Dr. Butch Caffall, Director

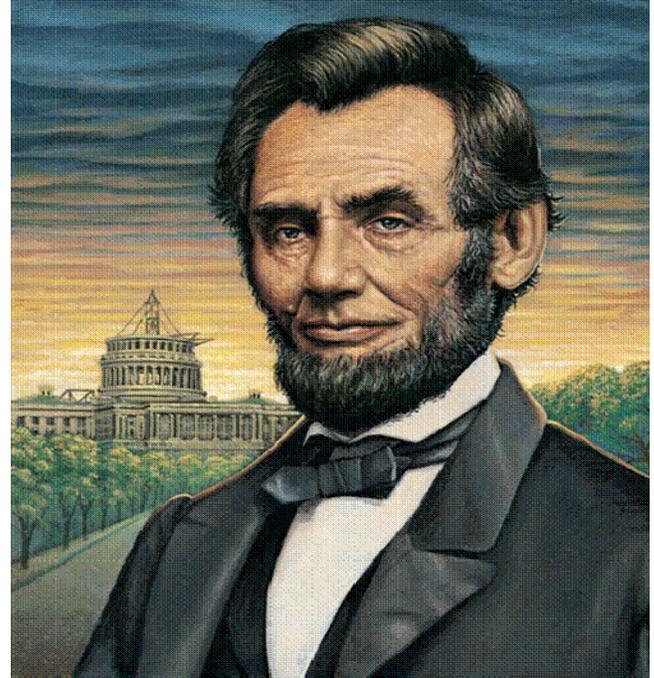
## Lesson 1: Share a Vision

William Herndon, Abraham Lincoln's law partner, described the sixteenth president as "a little engine of ambition." Lincoln had the vision to make something of himself. He may have started out as a farmer but he did not intend to stay one for the rest of his life. Lincoln studied surveying and the law to get ahead.

## Lesson 2: Be a Great Communicator

Abraham Lincoln knew how to communicate his core beliefs to his audience through humor, speeches, and letters to newspaper editors.

"Our government rests in public opinion. Whoever can change public opinion, can change the government."



## Lesson 3: Be a Lifelong Learner

Leaders are readers. Be a self learner. Grow yourself. Abraham Lincoln had less than a year of formal schooling but he learned how to learn on his own for the rest of his life.

## Lesson 4: Demand Excellence for Yourself

Lincoln's *Gettysburg Address* was not a last minute improvised speech that he hurriedly cobbled together on an envelope in the train. Lincoln gave himself enough time to do an excellent job despite a hectic schedule at the White House in the midst of the Civil War.

## Lesson No. 5: Learn From Failure

Lincoln failed in business at age 22; defeated for Illinois State Assembly at age 23; failed again in business at age 24; suffered a nervous breakdown at age 27; defeated again for Speaker of the Illinois State Assembly at age 29; defeated again for presidential elector at age 31; defeated again for US Congress at age 34; defeated again for US Congress at age 39; defeated again for US Senate at age 46; defeated again for Vice president of the newly formed Republican party at age 47; defeated again for the US Senate when he ran against Stephen A. Douglas

"The dogmas of the quiet past are inadequate to the stormy present. The occasion is piled high with difficulty, and we must rise with the occasion. As our case is new, so we must think anew, and act anew. We must disenthrall ourselves, and then we shall save our country."

at age 49; elected President of the United States at age 51. Lincoln was willing to risk failure, in order to experience success. He was not a case of overnight success.

## Lesson No. 6: Be a Role Model

Lincoln taught by example. For example, he was well known for his sense of compassion. Even Lincoln's children got into the act. His two youngest sons, Willie and Tad, sentenced one of their toy soldiers to death for sleeping on guard duty. Lincoln who had a way with children, wrote out a full pardon which he gravely signed as "A. Lincoln.

## Lesson No. 7: Believe in Yourself When No One Else Does by Having the Courage of Your Convictions

People asked Lincoln why he was confident about what he did. He answered, "I desire to conduct the affairs of this administration that if at the end, when I come to lay down the reigns of power, I have lost every other friend on earth, I shall at least have one friend left, and that friend shall be down inside me."

"If I were to try to read, much less answer, all the attacks made on me, this shop might as well be closed for any other business. I do the very best I know how - the very best I can; and I mean to keep doing so until the end. If the end brings me out all right, what's said against me won't amount to anything. If the end brings me out wrong, ten angels swearing I was right would make no difference."

## Lesson 8: If I am Not For Myself, Who Will be?

Abraham Lincoln published his own version of the 1858 Lincoln Douglas debates. He distributed this nationally to promote his political career. He also wrote follow up letters to key political leaders to enhance his availability as a presidential candidate.

## Lesson 9: Be a Decision maker

Lincoln reflected and led public opinion at the same time. Although Lincoln wanted to eventually abolish slavery, he could not be too far ahead of public opinion. A politician out of office cannot do any good. Lincoln issued Emancipation Proclamation when he educated public opinion to be in favor of it.

## Lesson 10: Be a Team Leader

Lincoln knew how to create a team. Every member of Lincoln's cabinet thought they should have been president instead of him!

Together, they won the Civil War.

"President Lincoln's cabinet included all of his major rivals for the Republican nomination for President. Many of them objected to the inclusion of each other in the cabinet. There were worries about both geographic distribution and balance between former members of the Whig and Democratic Parties. There were differences over ideology, ethics and personality. "No President ever had a Cabinet of which the members were so independent, had so large individual followings, and were so inharmonious."

## Lesson 11: Doing the Little Things Lead to the Big Things

Abraham Lincoln also started by doing little assignments to the best of his ability. During his

childhood, he honed his skills at story telling and joke telling. His brief stint as captain of a militia company, his first elective office, gave him confidence in his leadership ability. All these experiences served him well when he began his political career.

## Lesson 12: Show Compassion

We know Lincoln to be a great leader, a great visionary, and a great speaker. But his greatest strength, was that he was a man of great compassion. Lincoln in his Second Inaugural Address, reached the height of his compassion, when he declared: "With malice toward none; with charity for all." Theodore Roosevelt observed that Lincoln offered the hand of compassion to the fallen South instead of the kick of revenge.

"On principle I dislike an oath which requires a man to swear he *has* not done wrong. It rejects the Christian principle of forgiveness on terms of repentance. I think it is enough if the man does no wrong *hereafter*."

## Why does Lincoln live on in the nation's memory?

Lincoln knew how to inspire people to do their best. Lincoln knew how to learn from his mistakes so that he could go on. Lincoln had an inner vision of himself that could not be shaken by the nay saying. His leadership and his ideals remain timeless.

"There are no accidents in my philosophy. Every effect must have its cause. The past is the cause of the present, and the present will be the cause of the future."

### *Lesson 10 Revisited: Be A Team Leader*

To: IV&V Senior Staff  
From: Butch Caffall <Butch.Caffall@nasa.gov>  
Subject: Teamwork

I have observed an increasing level of teamwork amongst all of you in the past few months. I am very happy to see that team bonding! That does not mean that we will always agree with each other; however, it does mean that we will actively participate in decision making, respectfully debate among ourselves, and carry out the decisions that we make. A team can do so much more than an individual.

Greatly appreciated!!!!

## Team Leaders: Meet the IV&V Senior Staff

Former Associate Director of Operations, **Greg Blaney** has been named as Deputy Director.

Greg is a West Virginia native and has been with the Facility since 1997. He has spent the last several years managing Operations and Maintenance, Physical Security, Property Management, Information Technology, and as Enterprise Architecture (EA) Board Chair. He has led the Facility's efforts to be considered a center of excellence throughout his tenure. He will continue his work in many of these areas while taking on additional responsibilities, including managing a team of Engineers as we prepare our organization to become more hands on in our work for the Agency. Greg has an impressive professional background, including Federal Aviation Administration (FAA), Air Traffic Controller, Toledo Express Airport; NASA Tracking and Data Relay Satellite System (TDRSS) Network Director (ND) for XTE, EUVE, HST SM-1, and Special Programs, NASA, GSFC, Code 531; and as an IV&V Project Manager at our Facility. He has a BS in Professional Aeronautics (Embry-Riddle Aeronautical University) and, over the years has participated in a wide variety of Government Training Courses.



Deputy Director, Greg Blaney

**Bill Jackson**, former Acting and Deputy Director is taking on a new role for IV&V as the Technical Assistant, providing guidance to project managers and engineers alike.

Bill has always acted as technical advisor at IV&V but will now take on that role officially. He is well suited to this leadership position by virtue of his work as Project Lead: Shuttle, X-33, X-34, X-37, COTR GSA Work Package B (GSFC Code Y + Research Centers), ISO Quality System Management Representative. Bill transferred to the Facility in January of 1997 and brought with him a bank of experience unmatched



Technical Assistant, Bill Jackson

by any other project lead to date as first a Coop Student 66-70 at JSC; (Rendezvous Procedures Development) JSC 70-96: Apollo, Skylab Rendezvous Systems Analysis/Procedure Devel.; Shuttle Phase B team (entry GN&C systems); Shuttle (entry, orbit GN&C) engineering; Entry crew displays development and verification; Entry system/software V&V; Air Data Subsystem Manager; Rendezvous Analysis Manager: Space Station engineering; Reboost GN&C (low-thrust algorithm development); Debris Avoidance analysis and system prototype; ACRV (Soyuz) Evaluation Team; ESA ATV, NASDA HTV Evaluation Teams; Russian Soyuz/Progress GN&C Evaluation Team; ESA/NASA Relative GPS Flight Experiment development and ops; First level supervisor (90-95). Bill earned his B.S. in AeroSpace Engineering at Virginia Tech.

**Leigh Gatto** will continue his role as the IV&V Services Lead. Leigh began his career with NASA in May of 1991. Since that time, he has

worked at Goddard's Greenbelt, MD campus, the Wallops Flight Facility, the Independent Verification & Validation (IV&V) Facility and the Johnson Space Center. Now as Services



Services Lead, Leigh Gatto

Lead, Leigh supports the IV&V Program Managers, ensuring that NASA's critical software development efforts are provided with the highest quality IV&V analysis available. Prior to this assignment, Leigh served as the Branch Head for the Wallops Systems Software Engineering Branch. Other notable positions he has held include: Lead Mission Director for orbiting GSFC missions, SOHO Mission Director during its' recovery effort, Space Station Flight Controller and the developer of the Bowie State Satellite Control Center. Leigh is currently a participant in the GSFC Flight Projects Directorate's Project Management Development Emprise (PMDE). The PMDE program is designed to train future Project Managers. Leigh has been a Professor of "Space Operations" at Capitol College in Laurel, Maryland and served as Captain / C-130 Flight Navigator in the U. S. A Force and Maryland Air National Guard. Leigh earned his MS Management at the Johns Hopkins University) after receiving his BS Computer Science at the University of Maryland.

**Donna Ozburn**, Outreach Lead, will continue to serve in that capacity as the external communications (e.g., legislative, media) coordinator and as the project manager for the Educator Resource Center (ERC) and the Student Outreach Program. Donna leads the analysis and coordination of IV&V Facility cultural diversity and equal opportunity and serves as organizational spokesperson at public meetings, workshops, and press conferences. She is the project manager for IV&V's successful Cooperative and Intern Programs and is one of the most honored Outreach Managers in the Agency having received several Center and Agency awards for her innovative efforts on behalf of students and organizations throughout West Virginia. Donna is a native West Virginian and a graduate of Fairmont State College with a B.S. in Administration. She served the Federal government in the Department of Energy before joining the NASA IV&V team in 1994 as its first Resource Manager.



**Outreach Lead, Donna Ozburn**

**John Marinaro** has been named the IV&V Plans and Programs Lead upon returning to his native West Virginia and the IV&V Facility following his service as the Executive Director of the NASA Aerospace Safety Advisory Panel. In that role, he was responsible for managing an agency level, safety advisory panel which advises the NASA Administrator and Congress on the Agency's most significant issues that pertain to human safety (including the Space Shuttle and the International Space Station). This Panel consists of nine non-NASA members that include a retired Vice Admiral that led the Naval Air Systems Command, the V.P. of Safety at British Petroleum, the former V.P. of Safety at Delta Airlines, former Director of the Congressional Budget Office, former Chief of Safety for the U.S. Air Force and the Chief of the Safety for the U.S. Army. Prior to his assignment at Headquarters he was the Services Lead at IV&V. John has led five flight operations



**Plans and Programs, John Marinaro**

organizations. He has 18 years of service with the following Federal Agencies: NASA, Federal Aviation Administration, and the Naval Air Systems Command. John, a native West Virginian, has over 22 years military service in the U.S. Marine Corps, Navy and Army National Guard and retired in 2007 with over 3200 rotary and fixed-wing flight hours. He holds an Airline Transport Pilot certificate, is an active flight instructor, a member of the Civil Air Patrol and regularly pilots both helicopters and airplanes. John received a Masters of Aeronautical Science from Embry-Riddle Aeronautical University and Bachelor of Science in Electronics from Southern Illinois University. He recently graduated from the Georgetown University, Senior Executive Leadership Program.

Over the past ten years, **Marcus Fisher** has been involved in the project management functions of planning, scheduling, performance management and risk management, as well as the analysis of system software. For the past several months Marcus has been the lead for the Office of Safety and Mission Assurance (OSMA) Software Assurance Research Program as well as the lead for the Independent Verification and Validation (IV&V) Research Program. He has supervised and led multiple project managers, scientists and engineering teams to ensure research projects produce products that help NASA develop safe and reliable system software. In the coming weeks, Marcus will transition from the position of Research Lead to that of Deputy for IV&V Services. Marcus also holds a position at West Virginia University (WVU) where he teaches Embedded Software Engineering and Verification and Validation to graduate students seeking a Masters of Science in Software Engineering. He is the author of the book "Software Verification and Validation: An Engineering and Scientific Approach" ISBN: 978-0-387-32725-9 which was published in 2006.

**Marcus and his wife Hailie Amber Fisher became parents to the most beautiful girl (next to her Mother) in the world, Abigail Amber Fisher on March 22.**



**Research Lead, Marcus Fisher**



*Abigail Amber Fisher*

Leadership

## Our Value-Ables: *A Letter to the Editor*

Recently, a much respected member of our IV&V Family, Markland Benson, decided to accept a position at White Sands Testing Facility. All of us were sorry to see him take his great skill, talent and warm personality with him. As he left, he asked that he might leave a message behind for his colleagues. This message clearly required placement in this quarterly's *View* in the Our Value-Ables section. The following is his message to us as he takes on new responsibilities for NASA.



In March 1997, I was referred by my undergraduate professor to Mac Kincaid of Azimuth, Inc. for a corporate internship opportunity. I successfully interviewed for the position supporting the NASA IV&V Facility Scientific and Technical Assessments (SETA) contract. I was to perform testing on an Ada compiler used on the Cassini spacecraft to assure that it conformed to the Ada 83 standard and to look for any other bugs I could find. There was a C++ programmer internship in downtown Fairmont that paid more but I liked Ada (really) and went for the NASA gig. (I still get excited when some new find comes from Cassini, these many years later)

In late 1997, I became technical lead for the reengineering of the Production Support Flight Control Computer (PSFCC) software used by Dryden Flight Research Center (DFRC) for the F-18 High Angle-of-attack Research Vehicle (HARV). We had two interns, a graduate research assistant, a project manager, and bits and pieces of West Virginia University researcher Jack Callahan's time. While perhaps not the most sophisticated, we created a repeatable, third-party verifiable set of modifications that not only made the code more maintainable but also reduced the processor and memory use of the software. In order to feel confident in the changes made to the code, we knew we would have to thoroughly test the software against the original code before calling our work complete. We created a reusable, semi-automated test framework to help in this work. Given a set of inputs, the framework would execute both the original and latest versions of the code to see if the outputs were the same. We used McCabe QA to enumerate all of the branches graphically and we generated inputs to ensure that every branch was covered. All changes went through a paper-based change control process. The requirements for the code were reverse engineered into the Software Cost Reduction (SCR) tool to provide a balance between rigor in specification and understandability by all parties interested in the requirements. All of this was done on a single SPARCstation 20 workstation, which was terrible for graphics but amazingly good for multi-user text-terminal access. For those of you who understand such things, this workstation model has a 25 MHz processor and yet served all of our needs. The NASA project manager for SETA at the time was Greg Blaney and our Contracting Officer's Technical Representative (COTR) was Donna Ozburn. In those days, IV&V was part of Ames Research Center with a part-time director who I cannot recall ever seeing. West Virginia University started their Masters of Science in Software Engineering program for which I applied and had to wait a year until it opened a more traditional, academic entry route as I did not yet have enough work experience to enter under the auspices of experienced software engineer.

The SETA contract ended and so I moved on from NASA to work on various Navy and Army contracts for Azimuth, primarily in training and simulation. However, I had in mind to field another Azimuth team at NASA, so when an opportunity came up to subcontract to Averstar (now L-3/Titan), I jumped. I had envisioned an Azimuth team but ended up being the sole Azimuth representative selected. In 1999, I became IV&V analyst for the Command Manager on the Checkout and Launch Control System meant to replace the existing Launch Processing System for the Space Shuttle. I had opportunity to explore a number of different tools and technologies as well as sharpen my people skills trying to chase down my elusive counterpart in CLCS. I worked with Doh Ohi, Tony Pratt, Chris Williams and Valerie Jones to mention a few, all of whom I respect for their skills and work ethic. Ken Costello was our NASA project manager. In these days, IV&V transitioned from Lou Blazy as Director to Judy Bruner. Also, IV&V went from Ames to become part of Goddard Space Flight Center. While both Azimuth and Averstar were good to me, in time, I was persuaded to try something different and signed up with Fenwick Technologies, a small company in Clarksburg at the time.

Fast forward a couple of years and one Air Force knowledge management system later and you find me signing up for NASA civil service with the encouragement of Greg Blaney. I returned to NASA helping out with the SIRTf IV&V analysis followed up by analysis and a deputy role on Hubble Space Telescope Servicing Mission 4 (HST SM4) under the mentorship of Frank Huy. Since then I have been deputy and analyst on

Swift and IV&V manager for HST SM4, the Hubble Robotic Servicing and Deorbit Mission, Active Aeroelastic Wing, and now again HST SM4 and the International Space Station. In the midst of all these roles, I also got to investigate the effects of reuse on IV&V, perform Planning and Scoping (P&S) analyses, collect and analyze P&S data to improve the process, and have a go at training up the next generation of IV&V civil service managers/analysts. Sprinkle that with an analyst role in the earliest days of the Constellation Program, creating career frameworks for NASA software engineers and IV&V manager, and mucking around in a number of research initiatives and I find myself with a very full and satisfying four and one-half years in my latest stay at NASA IV&V.

I have my reasons for writing this, more of gratitude than self-gratification. One is to help people see how this Facility shaped my attitudes toward software development for the better. As an undergraduate, I learned to solve problems, design data structures, and construct software solutions. I did not learn requirements engineering, formal design, and by no means verification and validation. While it is not quite right to say it this way, I will say that IV&V added engineering to the science and mathematics with which I entered my career. Another reason this article is worthwhile is that it (in brief) points out milestones in NASA IV&V's history. In my time, the building has gone from sparsely populated to far more people than space available. NASA IV&V has gone from purely research to a healthy balance of research and "operations". This program has adapted to ISO-9000, Earned Value Management, Full Cost Accounting, Object-Oriented Design, and Model-Based Design (just to throw about some of the relevant buzzwords). What has remained through all of the years are people dedicated to getting software right.

More than just smart people who like to lodge complaints against the products of others, NASA IV&V to me is a noble calling of those fully able to hold their own as developers or managers elsewhere in the world but who have chosen to forgo that world for the sake of the safety and quality of NASA missions, for the love of West Virginia, and/or for other sundry reasons. Whatever their cause, I have had the opportunity to spend time with many, really get to know a few, and to call all *family*. Thank you to the NASA IV&V family.

*Markland Benson*

## Peer Awards: *Teamwork*

**Kenneth Vorndran, Deborah Kromis and Tom Macauley** were recently honored with a Peer Award for Teamwork, Excellence, Respect and Balance as members of the CxSI IV&V Team. All the members of this team volunteered their time in addition to their many responsibilities. They worked beyond the call to provide the highest quality of analysis possible in the 10-working day period allotted for each review. The team implemented a highly effective "Peer Review" process resulting in a high percentage of Review Item Discrepancies (RIDs) being ultimately accepted by the Board members (80%). In many instances, team members collaborated and assisted one another with difficult to understand requirements and correction, challenged one another to provide the highest quality RIDs to the Program/Projects while remaining respectful to each other and maintaining a good teamwork environment.



*Nominator: Frank Huy*

**Markland Benson** was recognized for his teamwork mentality, willingness to help and ability to do so expertly. Markland stepped into a very difficult situation involved technical nuances and complexities. True to form Markland did so with expertise and grace.

*Nominator: Judi Connelly*

**Scott Shields and Eric Sylvania** demonstrated skill, experience and dedication when beginning with our project. Their task required a very short turn around for a significant amount of work. Both Eric and Scott dedicated themselves to completed this task within the time limits. *Nominator: Judi Connelly*